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2019

Liao , W 2019 , Aquatic Macroinvertebrates and Vegetation in Kruunuvuorenlampi .

http://hdl.handle.net/10138/311888

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30.11.2019

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Introduction

Kruunuvuorenlampi (60º10’21” N, 25º00’52” E) locates in Kruunuvuori, a very valuable geological site in Laajasalo, southeast Helsinki (Figure 1; Salla 2004). The pond is approximately 8 m above the sea level and has separated from the sea for 2400 years. The emergence of Kruunuvuorenlampi from the Baltic Sea has been well studied, and its formation was illustrated in an article by Seppä and Tikkanen (1998). There is no inlet to Kruunuvuorenlampi, but in the southwest corner is a minor artificial outlet, which is wet in spring when the pond has the highest water level (Seppä & Tikkanen 1998). The water surface of the pond is approximately 0.42 hectare (Saarikivi 2007).

Kruunuvuorenlampi and its surroundings harbour a wide range of animals and plants. For example, Saarikivi (2007) found that Kruunuvuorenlampi had the most abundant reptiles and amphibians among the ponds in Helsinki. Moor frogs (*Rana arvalis*) have been observed recently years (laji.fi). Many bird species live in the surrounding forests, including Eurasian treecreepers (*Certhia familiaris*) and black woodpeckers (*Dryocopus martius*, Marttila 2007). Various vascular plant species, such as marsh Labrador tea (*Rhododendron tomentosum*), were recorded in previous literature (Seppä & Tikkanen 1998; Enviro 2005; Marttila 2007). Due to its special and untouched nature status, Kruunuvuorenlampi has become a part of Luonnonsuojeluohjelma 2015 – 2024 under the Category II 2019 – 2021 (Erävuori et al. 2015, Liite 4).

The aim of this survey is to investigate aquatic macroinvertebrates and update the information of vegetation in the Kruunuvuorenlampi.

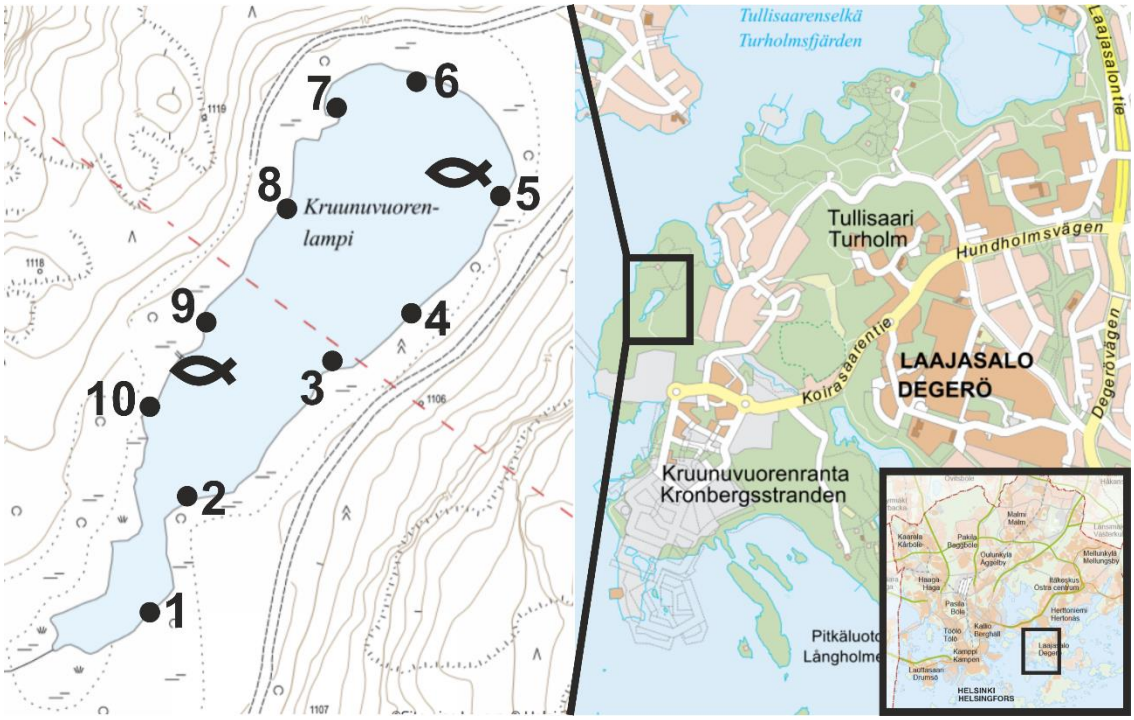

Figure 1 Kruunuvuorenlampi is located in Laajasalo, southeast Helsinki. The two fish shaps are the locations where the fish traps were set. The ten dots were the handnet sampling spots of aquatic macroinvertebrates. Four activity traps with beef were set at spots 2, 5, 7, and 10 respectively. The vegetation was surveyed at spots 1, 3, 5, 7, and 10; each spot had two vegetation plots, one by the pond edge and the other 3m from the edge.

Sampling Methods

Aquatic macroinvertebrates were surveyed at ten spots of the pond margin (Figure 1) by sweeping a D-shaped handnet for a 1-minute time interval (Liao 2018). To determine the presence or absence of two protected diving beetle species, *Graphoderus bilineatus* and *Dytiscus latissimus*, four 1-litre activity traps were operated in the

Figure 2 An activity trap with fresh minced beef.

pond for 48h, with 20g of fresh minced beef in each trap as bait. Two fish traps were operated for 24h in the northeast and the southeast of the pond respectively (Figure 1).

Figure 3 1m×1m vegetation plot.

To investigate the vegetation of the pond, ten 1m×1m vegetation plots at five spots were surveyed. Also, I walked along the shore with a binocular to record plant species in the water. All fieldwork was conducted between 1st – 15th July 2019. The macroinvertebrates were identified to the lowest possible taxonomic level, and the plant species were to the species level.

Aquatic Macroinvertebrates

Kruunuvuorenlampi supports a diversity of aquatic macroinvertebrates, but the targeted two species, *Graphoderus bilineatus* and *Dytiscus latissimus*, were not recorded in the pond. In total, the handnet survey recorded 35 species/taxa under 10 orders: Araneae (1 family, 1 species), Trombidiformes (2 families, 2 species), Coleoptera (4 families, 14 species), Diptera (1 family), Hemiptera (2 families, 3 species), Odonata (4 families, 7 species), Trichoptera (2 families, 3 genera), Isopoda (1 species), Lumbriculida (1 family), and Hirudinea (Appendix 1). The activity traps caught 4 diving beetle species different from the handnet samples. They were *Hydaticus seminiger, Ilybius angustior, Ilybius quadriguttatus,* and *Ilybius subaeneus* (Appendix 2); all are common species in Finland. One common goldeneye (*Bucephala clangula*) duckling was observed living in

Kruunuvuorenlampi independently throughout the fieldwork season (Figure 4), suggesting that the macroinvertebrates were able to support waterbirds.

Figure 4 A common goldeneye (*Bucephala clangula*) duckling in Kruunuvuorenlampi.

Although the fish traps caught no fish, the absence of small-sized diving beetles suggests that there could be fish in Kruunuvuorenlampi. The deepest water is 2m, which suggests that fish has the condition to survive in the pond, because the water does not freeze to the bottom in winter. A more sophisticated fish investigation is needed to verify if and what fish species are present in Kruunuvuorenlampi.

Vegetation

Kruunuvuorenlampi has a rich seed bank (Appendix 3). Two waterlily species, *Nymphaea alba* and *N. tetragona*, covered 15% of the water, while the pond edges were mainly occupied by sedges (*Carex* spp.) and water-arums (*Calla palustris*; Figure 5 & 6). In the vegetation plots, 25 species under 13 families were recorded: Araceae (1 species), Cyperaceae (2 genera, 5 species), Dennstaedtiaceae (1 species), Droseraceae (1 species), Ericaceae (2 genera, 2 species), Primulaceae (1 species), Rhamnaceae (1 species), Rosaceae (3 genera, 5 species), Dicranaceae (1 species), Hylocomiaceae (1 species), Polytrichaceae (1 species), Campyliaceae (1 species), and Sphagnaceae (1 genus, 4 species). The vegetation plot survey still underestimated the plant species richness in Kruunuvuorenlampi, because some species, such as *Scirpus sylvaticus* and *Menyanthes trifoliate*, were observed outside the plot frames.

The recorded mosses were *Dicrnum majus, Hylocomiastrum umbratum, Polytrichum commune, Straminergon stramineum, Sphagnum palustre, Sphagnum flexuosum, Sphagnum fallax,* and *Sphagnum riparium*. Among the recorded *Sphagnum* spp., *S. riparium* is a hollow (dry surfaces) species, *S. fallax* and *S. flexuosum* intermediate species, *S. palustre* a hummock (wet surfaces) species (Laine et al. 2009), which indicates a diversity of microhabitats with different moist gradients. The four *Sphagnum* spp. also suggest that the pond water was between oligotrophic to mesotrophic.

Compare with older vegetation records (Seppä & Tikkanen 1998; Marttila 2007), a higher number of species were observed, while purple loosestrife (*Lythrum salicaria*), a common species, was missing in summer 2019.

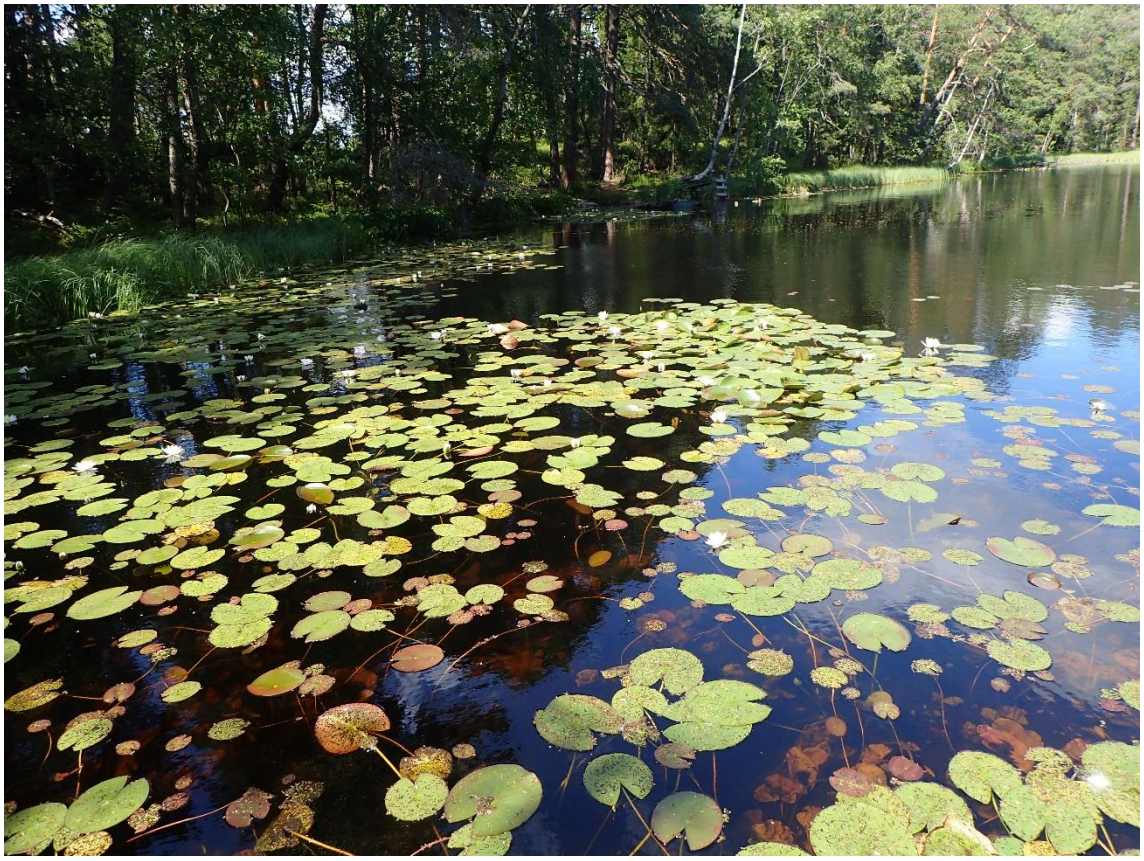

Figure 5 A view of Kruunuvuorenlampi, with two waterlilies in the water.

Figure 6 The stems of the European white waterlily (*Nymphaea alba*, on the left) and the Finnish waterlily (*N. tetragona*, on the right).

Summary

Kruunuvuorenlampi separated from the Baltic Sea 2400 years ago and is a valuable geological site. The pond and its surroundings harbour a wide range of animals and plants. Yet, little was known about the aquatic macroinvertebrates in Kruunuvuorenlampi. The aim of this survey is to investigate what macroinvertebrate species/taxa distribute in the pond and to update the information of vegetation in and surrounding the pond.

The macroinvertebrates were sampled with a D-shaped handnet and 1-litre activity traps. The vegetation in the water was surveyed with a binocular when I walked along the shore. The 1m×1m vegetation plots were applied to survey plant species and coverage by the shore and 3m from the shore.

In total, 39 macroinvertebrate species under 10 orders were recorded in this survey. A common goldeneye (*Bucephala clangula*) duckling was observed living in the pond independently throughout the fieldwork season, which suggests that the macroinvertebrates can support waterbird breeding. The fish traps caught no fish in Kruunuvuorenlampi, but no small-sized aquatic beetles were recorded, suggesting that there might be fish with low abundance. More investigation is needed to verify if and what fish species are present in the pond.

Two waterlily species, *Nymphaea alba* and *N. tetragona*, had large coverage (15%) in the water, while the pond edges were mainly occupied by sedges (*Carex* spp.) and water-arum (*Calla palustris*). In the vegetation plot survey, 25 species under 13 families

were recorded by the shore of Kruunuvuorenlampi. The plot survey still underestimated the plant species richness, because species, such as *Scirpus sylvaticus* and *Menyanthes trifoliate*, were observed outside the plot frames. The recorded *Sphagnum* spp. indicates that Kruunuvuorenlampi has a diversity of microhabitats with different moist gradients.

Tiivistelmä

Kruunuvorenlampi jäi eristykseen Itämerestä 2400 vuotta, ja se on geologisesti arvokas kohde. Lammessa ja sen ympäristössä on monipuolinen eläimistö ja kasvillisuus. Se vesiselkärangatonlajistoa ei kuitenkaan tunneta hyvin. Tämän työn tarkoitus on selvittää mitä vesiselkärangattomia lammessa elää, ja päivittää tieto lamman ja sen rannan kasvillisuudesta.

Vesiselkärangattomia pyydettiin D:n muotoisella haavilla sekä yhden litran vetoisilla aksiivisuuspyydyksillä, jotka koostuvat lasipurkista ja sauppilosta. Vedessä olevaa kasvillisuutta tarkasteltiin kiikareilla rannalta käsin lammen ympäri kuljettaessa. Rannalla ja kolme metriä rannasta olevaa kasvillisuutta tarkasteltiin 1m×1m kasvillisuusruuduilta.

Lammesta löytyi 39 vesiselkärangatonlajia, jotka kuuluivat 39 luokkaan. Itsenäinen telkänpoika varttui lammessa, mikä viittaa siihen, että lammessa on tarpeeksi ravintoa vesilintupesintään. Kaloja ei pyynneissä saatu saaliiksi. Lammesta ei kuitenkaan saatu saaliiksi pieniä sukeltajakuoriaisia, mikä vittaa siihen mahdolisuteen, että lammessa olisi hieman kaloja. Kalastoa olisi tarpeen selvittää tarkemmin.

Lumpeiden peittävyys vedessä oli melko suuri, 15 %. Rannan kasvillisuutta dominoivat sarat ja vehka. Kasvillisuusruuduilta lötyi 25 lajita, jotka kuuluivat 13 heimoon. Kaikki havaitut lajit, kuten korpikaisla ja rate, eivät osuneet kasvilisuusruutyihin. Havaitut Sphagnum spp. lajit viittaavat siihen, että rannan kosteusolot ovat varin vaihtelevat.

Acknowledgement

I thank Dr Petri Nummi for translating the summary into Finnish.

References

Erävuori L, Lammi E, & Routasuo P (2015). Helsingin luonnonsuojeluohjelma 2015-2024 ja metsäverkostoselvitys, korjattu ehdotus, Liite 4. Helsingin kaupunki, Ympäristökeskus.

Enviro (2005). Kruunuvuorenrannan osayleiskaava-alueen luontoselvitys ja maankäytön luontovaikutusten arviointi.

Laine J, Harju P, Timonen T, Laine A, Tuittila ES, Minkkinen K, & Vasander H (2009). The Intricate Beauty of Sphagnum Mosses – a Finnish Guide to Identification. Department of Forest Ecology, University of Helsinki.

Laji.fi Observation of Moor frogs (*Rana arvalis*): https://laji.fi/observation/map?target=MX.37621 accessed on 25th November 2019.

Liao W (2018). The Response of Aquatic Invertebrates to the Removal of the Invasive Prussian Carps in the Muumilampi Pond.

Marttila H (2007). Helsingin lammet.

Seppä H, & Tikkanen M (1998). The isolation of Kruunuvuorenlampi, southern Finland, and implications for Holocene shore displacement models of the Finnish south coast. *Journal of Paleolimnology*, *19*(4), 385-398.

Salla A (2004). *Kallioperän ja maaperän arvokkaat luontokohteet Helsingissä*. Helsingin kaupungin ympäristökeskus.

Saarikivi J (2007). Helsingin matelija- ja sammakkoeläinlajisto sekä tärkeät matelija- ja sammakkoeläinalueet vuonna 2007.

Appendix 1 Macroinvertebrates sampled by a handnet.

Family/Heimo	Lowest possible taxonomic level	1	2	3	4	5	6	7	8	9	10
Chrysomelidae	Chrysomelidae					2		2	1		
Dytiscidae	*Acilius canaliculatus*									1	
	Dytiscus marginalis larvae						1				
	Hygrotus inaequalis larvae					1	1				1
	Ilybius aenescens							1			
	Ilybius ater		1								
	Ilybius crassus		1							1	2
	Ilybius guttiger		1				1	1			
	Platambus maculatus						1				
	Suphrodytes dorsalis		3		3	1	2			6	
Hydrophilidae	*Enochrus ochropterus*							2			
	Enochrus coarctatus			2			2		3		
	Loccobius minutus	1	1	1				2			
Noteridae	*Noterus clavicornis*		7		1	3	1				
Limnephilidae	*Phacopteryx*	5	2	11	3	2		8	4	3	
	Limnephilus					1			1		
Phryganeidae	*Phryganea*	1					1		1		

Appendix 1 continued. Macroinvertebrates sampled by a handnet.

Family/Heimo	Lowest possible taxonomic level	1	2	3	4	5	6	7	8	9	10
Lestidae	*Lestes sponsa*		1	2		1				2	
Aeshinidae	*Aeshna cyanea*								1		
	Aeshna grandis										1
Corduliidae	*Cordulia aenea*				3	1					
Libellulidae	*Leucorrhinia dubia*									1	
	Leucorrhinia rubicunda									4	
	Sympetrum fonscolombii			2						2	
Dictynidae	*Argyroneta aquatica*		4	2	4	5	1	11	4	6	11
Limnocharidae	*Limnochares aquatica*		1	3	4				11		
Hydrodromidae	*Diplodontus despiciens*	2									
Asellidae	*Asellus aquaticus*	8	15	5	5	13			3	11	3
Lumbriculidae	*Lumbriculidae*						1	1	2		1
	Hirudinea		1				1		3	2	

Appendix 2 Diving beetles (Dytiscidae) sampled by activity traps with fresh minced beef. Trap 4 was empty.

Species / Laji	**Trap 1 (Spot 2)**	**Trap 2 (Spot 5)**	**Trap 3 (Spot 7)**	**Trap 4 (Spot 10)**
Acilius canaliculatus	1			
Hydaticus seminiger			3	
Ilybius angustior			1	
Ilybius guttiger	3	6		
Ilybius quadriguttatus	1	1	1	
Ilybius subaeneus	1			

Appendix 3 The coverage of each plant species in the 1m×1m plots. X.1 plots were by the pond margin, and X.2 plots were 3m from the margin.

		Vegetation Coverage (%)									
Family/Heimo	***Species* / laji suomeksi**	**Plot 1.1**	**Plot 1.2**	**Plot 2.1**	**Plot 2.2**	**Plot 3.1**	**Plot 3.2**	**Plot 4.1**	**Plot 4.2**	**Plot 5.1**	**Plot 5.2**
Araceae	*Calla palustris* suovehka	2 %	0.50 %	10 %		8 %	5 %	2 %		0.10 %	
Cyperaceae	*Carex canescens* harmaasara			1 %							
	Carex panicea hirssisara								2 %		
	Carex rostrata pullosara	45 %	20 %			10 %				10 %	10 %
	Carex spicata hakarasara				2 %						
	Eriophorum vaginatum tupasvilla						2 %				
Dennstaedtiaceae	*Pteridium aquilinum* sananjalka				25 %						
Droseraceae	*Drosera rotundifolia* pyöreälehtikihokki										2 %
Ericaceae	*Empetrum nigrum* variksenmarja		0.10 %								
	Rhododendron tomentosum suopursu		10 %					5 %			
Primulaceae	*Lysimachia thyrsiflora* terttualpi	0.10 %				2 %		0.10 %			

Appendix 3 continued. The coverage of each plant species in the 1m×1m plots.

		Vegetation Coverage (%)									
Family/Heimo	***Species* / laji suomeksi**	**Plot 1.1**	**Plot 1.2**	**Plot 2.1**	**Plot 2.2**	**Plot 3.1**	**Plot 3.2**	**Plot 4.1**	**Plot 4.2**	**Plot 5.1**	**Plot 5.2**
Rhamnaceae	*Frangula alnus* korpipaatsama				25 %						
Rosaceae	*Potentilla palustris* kurjenjalka			1 %		2 %		2 %			
	Rubus chamaemorus lakka		5 %				2 %				
	Vaccinium myrtillus mustikka		10 %	15 %	30 %		15 %	5 %	60 %		
	Vaccinium oxycoccos isokarpalo	0.50 %	20 %			25 %	5 %			2 %	20 %
	Vaccinium vitis-idaea puolukka			20 %	5 %		1 %	1 %	3 %		
Mosses	*Sphagnum spp.* rahkasammalet	8 %	55 %	100 %	8 %	100 %	95 %	20 %	45 %	100 %	100 %
	Other mosses muit sammaleja	2 %	3 %					75 %	23 %		

Appendix 4 The moss species recorded in the vegetation plots. X.1 plots were by the pond margin, and X.2 plots were 3m from the margin.

Species / Laji	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5	
	1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2
Dicrnum majus								×		
Hylocomiastrum umbratum	×	×						×		
Polytrichum commune							×			
Straminergon stramineum	×									
Sphagnum palustre			×	×		×	×			
Sphagnum flexuosum	×	×		×	×			×	×	×
Sphagnum fallax									×	×
Sphagnum riparium					×	×	×			